of Mr. Hutchinson, who has written a powerful letter to the *Times*. In this letter he sets forth how easy it would be to arrange to use the clinical material at the docks in connection with an institution which is at present appealing to the public for funds, viz. the Post-Graduate Medical Polyclinic in Chenies Street, Gower Street. Mr. Hutchinson points out that lectures will probably be delivered at the Albert Docks by professors living in the immediate neighbourhood of Harley Street, and be listened to by students living in the neighbourhood of Gower Street; hence much time will be lost both by teachers and taught, who could obviously come together, for everything except actual bed-side teaching, upon more convenient premises, viz. those of the Post-Graduate College. On the other hand it is contended, on the part of the promoters of the Home Secretary's scheme, that what is required is a school entirely devoted to the study of tropical medicine, where students shall do nothing else, and shall give their whole time to this branch of medicine. It cannot be denied that living in the atmosphere of a subject is greatly conducive to the quick acquisition of a knowledge of it. How this result is brought about is not quite so clear; it seems to be a kind of intellectual osmosis. Apparently what the Home Office want is to run their candidates quickly through somewhere where they can quickly gain a good knowledge of tropical medicine, and be then able to materially aid colonisation. They do not want the time of their candidates wasted in going here for lectures, there for clinical cases, and somewhere else for bacteriology. Whether the extra expense involved in concentrating all the requisites for this special education under one roof will be money spent to the greatest advantage from the point of view of general medical education, is perhaps questionable. The scheme will, however, appeal to the commercial and philanthropic interests involved as business-like, and will probably receive their support. It is to be hoped that neither the local interests of medical cliques on the one hand, nor the colossal dignity of the College of Physicians on the other, will prevent the whole medical profession co-operating to the attainment of a thorough knowledge of tropical medicine by all those who intend to be concerned in its practice.

SOILS FOR ARTIFICIAL CULTURES.

AN increasing amount of experimental work on the growth of plants is being done by means of cultures in artificial soils. It is quite clear that the success of investigations so conducted must largely depend on the perfect suitability of the soil for the production of a full and normal growth. Little attention is, however, frequently given to this point. It is, in fact, often assumed that a pure quartz sand watered with a nutritive solution supplying phosphates, sulphates and chlorides, of potassium, calcium, magnesium and iron, is a fit and proper soil, and that any deficiency of luxuriance in plants grown in such a medium is due to some special circumstance unconnected with the general conditions of the experiment.

Whether some plants are capable of reaching a fair development when placed under the conditions just described is hardly the question; the point on which I wish to lay stress is that such a soil is in several respects a most unnatural medium for plant growth, and is thus generally unsuited for purposes of investigation.

The salts just named are often spoken of as constituting a "full mineral supply," and the conditions described are reckoned as quite suitable for the culture of a leguminous plant, which derives its nitrogen from the atmosphere, if only the organism producing nodules on the roots is also introduced. It is quite true that the salts in question, if applied to an ordinary arable soil, would furnish an adequate supply of the ash constituents demanded by the plant; but in this case the form in which they would reach the plant would be entirely different from that which occurs in the case of the artificial soil of quartz sand.

In the natural soil, containing calcium carbonate, hydrate silicates, and hydrate ferric oxide, all the alkali salts applied as manure are decomposed; their acids combine with the lime of the soil, and their bases are held in feeble combination on the surface of moist silicates and ferric oxide, from which they are easily extracted by the acid sap of the root hairs. What an immense difference this must make to the plant! In the first place, there is no hurtful excess of saline matter in the soil. The potash has been precipitated upon the surface of the soil particles, while the acid it was formerly combined with has been carried off united with lime in the drainage water. In the next place, the plant is well provided with bases with which the organic acids which it is constantly producing can combine. This is surely a most important point. What can a plant do that is fed on chlorides and sulphates in a mass of pure quartz? How can it get rid of the acids, and obtain bases to supply its own wants? It must be, at least, a very slow and painful business. In a natural fertile soil, not only are the alkalies, as already mentioned, largely supplied to the plant as bases, but the soil water itself always contains a quantity of calcium carbonate dissolved in carbonic acid.

That a plant does require this supply of bases is evident from the character of plant ash. The ashes of plant leaf and stem are always of an alkaline character; those from leguminous plants are highly alkaline, and consist chiefly of carbonates, the residues of the salts of organic acids which have been destroyed on ignition.

The immense improvement in the luxuriance of an artificial culture in sand which is observed when a nitrate is added to the nutritive salts employed, is not to be entirely attributed to the supply of nitrogen thus given. The nitrate is, in this case, the only salt which can supply the plant with a base, and its addition to the soil thus greatly improves the general conditions of growth. The nitrate acts in this way because the nitric acid is employed in the plant for the production of nitrogenous organic matter, and its base at once becomes available for combination with organic acids.

For most experiments there is no necessity for employing the favourite mixture of quartz sand and soluble inorganic salts. Any fertile sandy soil may be used as well, and can be as thoroughly sterilised if sufficient care be taken, but it should not be dried or burnt if its special chemical properties are to be retained. If the nearly complete absence of organic matter is desired, the sand can be taken two feet below the surface.

If an artificial soil is needed, the quartz sand should in every case be mixed with 2–5 per cent. of calcium carbonate. Powdered felspar is an excellent addition to an artificial soil. The mixture must also have a sufficient power of holding water; the sand must, therefore, be fine. If the conditions of the experiment do not forbid it, some humic matter should be supplied. Mr. Mason, who has been very successful with cultures in artificial mixtures, adds 1 per cent. of moss-litter to his soils. The water in natural soils always contains carbonic acid. This point also must not be forgotten, especially when no addition of humic matter has been made.

R. WARINGTON.

NOTES.

ON Monday at Osborne the Queen held a private investure of the Orders of the Bath, St. Michael and St. George, and the Star of India. Sir William Roberts-Austen, K.C.B., and Sir William Thiselton-Dyer, K.C.M.G., had the honour of knighthood conferred upon them. Sir Charles Cameron received the decoration of the civil division of the third class of the Order of the Bath.

Prof. Mendeléeff has been elected a corresponding member of the Paris Academy of Sciences, in succession to the late Prof. Kékulé.

Prof. E. Ray Lankester, F.R.S., has been elected Foreign Associate of the Royal Academy of Sciences, Arts, and Belles Lettres of Belgium, in succession to the late Prof. Leuckart, of Leipzig.

M. Dybowski, director of agriculture in Tunis, and professor at the Agronomic Institute, has been appointed director of the colonial garden about to be established at Vincennes upon the plan of the Royal Gardens at Kew.

M. Milne-Edwards, director of the Paris Natural History Museum, has been promoted to a commandership of the Legion of Honour. Among the new chevaliers of the same order are Prof. Floquet, of Nancy; Dr. Hanriot, member of the Paris Academy of Medicine; Prof. Dufet, of the lycée Saint-Louis; and Prof. Desmons, professor of mathematics at the lycée Janson-de-Sailly.

The Council of the Manchester Literary and Philosophical Society have awarded the Wilde Medal of the Society for 1899 to Sir Edward Frankland, K.C.B., F.R.S., and the Wilde Premium for 1899 to Dr. Charles H. Lees. The Wilde Lecture will be delivered by Prof. W. Ramsay, F.R.S., on February 28, when the presentation of the medal and the premium will also be made.

The Marquis of Salisbury has forwarded to the Mayor of Dover (Sir W. H. Crundall) a subscription of 100*l.* towards the fund for entertaining the members of the British Association on the occasion of their meeting at Dover this year.

Reuter reports that the Emperor of Russia has granted the Russian Geographical Society the sum of 42,000 roubles towards the fitting out of a scientific expedition to Central Asia.

Dr. Fleurent has been appointed professor of industrial chemistry at the Paris Conservatoire des Arts et métiers, in succession to the late M. Aimè Girard.

The municipal council of Nuits-Saint-Georges, Department of Côte-d'Or, have decided to erect a monument in honour of M. Tisserand, the distinguished astronomer and late director of the Paris Observatory, and have voted a sum of one thousand francs towards it. M. Tisserand was born at Nuits-Saint-Georges on January 13, 1845, and the erection of a monument in his native town will be an appropriate memorial of his scientific work. A strong patronage committee, having the Minister of Public Instruction and Fine Arts as honorary president, and M. Faye as president, has been formed. The president of the organising committee is Dr. Boursot, Mayor of Nuits-Saint-Georges, and the treasurer is M. Desmazures, the municipal receiver of that town. Admirers of Tisserand's work are invited to send to M. Desmazures subscriptions in aid of the memorial which it is proposed to raise.

Dr. H. N. Stokes has been elected president of the Chemical Society of Washington.

The American Academy of Arts and Sciences has elected Prof. C. D. Walcott, of Washington, an Associate Fellow in succession to the late Prof. James Hall, and Mr. Oliver Heaviside, F.R.S., a Foreign Honorary Member.

We regret to see the announcement of the death of the Rev. Thomas Hincks, F.R.S., distinguished by his works in several departments of marine zoology.

The annual general meeting of the Physical Society will take place on Friday, February 10. The Royal Astronomical Society will hold its anniversary meeting on the same day.

The *British Medical Journal* announces that Prof. William Osler, F.R.S., of the Johns Hopkins University, Baltimore, has accepted an invitation to deliver the Cavendish lecture for 1899, before the West London Medico-Chirurgical Society.

The Paris correspondent of the *Times* states that the selection, by the Institution of Civil Engineers, of M. Picard, Commissioner-General for the Paris Exhibition of 1900, as an honorary member in succession to the well-known ironmaster, the late M. Schneider, of Creusot, has given great satisfaction in Paris.

Reuter reports that an earthquake, lasting three minutes, occurred in Mexico at nine minutes past five in the afternoon of January 24. The earth-movement was partly from north-east to south-west, and partly from north-west to south-east. More than two hundred buildings were seriously damaged, and ten houses completely collapsed.

Sir William McGregor, K.C.M.G., who has been appointed Governor of Lagos, is an M.D. of the University of Aberdeen, and has held various medical appointments in Scotland and the Colonies. In 1888 he was made the first Administrator of British New Guinea, and in 1895 Lieutenant-Governor of the Colony, a post he has held up to the present time. He has received the honorary degrees of LL.D. from Aberdeen, and of D.Sc. from Cambridge.

The *Lancet* states that the occasion of the delivery, by Sir William MacCormac, of the Hunterian Oration at the Royal College of Surgeons of England this year will be distinguished by the presence of the Prince of Wales, who has also consented, at the president's invitation, to dine with the College the same evening. It is not the first time that the Prince of Wales has honoured the Hunterian orator by attending the delivery of the oration. He was present when Sir James Paget and Mr. Bryant were the orators.

We have already mentioned the retirement of Prof. Alexander Agassiz from the directorship of the Museum of Comparative Anatomy at Cambridge (Mass.). It appears that Prof. Agassiz's resignation was accompanied by conditions which covered a deed conveying to the President and Fellows of Harvard College munificent gifts of natural history collections. Arrangements have been made by which the late director will have the use of certain rooms and storehouses, as well as a claim on the clerical services of some members of the museum staff. In addition to the collections, there are handed over, as late personal belongings, all the copies remaining in stock of the volumes of the *Bulletin*, and of the *Memoirs*, together with all the publications received in exchange for these issues, about 3500 volumes, and the books which Prof. Agassiz has purchased during the past twenty years, about 5000 volumes. Prof. Agassiz intends now to devote his time to explorations and the publication of reports of these undertakings.

The twenty-sixth annual dinner of the old students of the Royal School of Mines, with Mr. F. W. Harbord, metallurgical chemist to the Indian Government, in the chair, was held on Friday last, January 27, at the Hôtel Cecil. Of the Professors, Sir W. Roberts-Austen, Rücker, Tilden, and Howes were present, and about 120 of the past and present students. The Chairman, in proposing the chief toast—that of the mining and metallurgical industries—dwelt upon the modern conditions of capital, labour, transport and education, and their bearing on the old students who had to direct those industries. Other speakers were Prof. Roberts-Austen, Prof. H. McLeod, Prof. A. W. Rücker, Sir H. Trueman Wood, Mr. R. C. Styles, Mr. L. C. Stuckey, Mr. Bennett H. Brough, Colonel J. Pennycuick, Mr. Bedford McNeill, and the honorary secretary, Mr. H. G. Graves.

THE British Fire Prevention Committee has just opened its testing station at Regent's Park. The arrangement of the establishment are in the hands of the executive of the Committee, Mr. Edwin O. Sachs (the chairman) personally supervising the work, with the assistance of a sub-Committee, comprising Mr. R. Mond, Mr. Farrow, and Mr. Max Clarke. The purpose of the tests, as defined by Mr. Sachs at Tuesday's press view, is to obtain trustworthy data as to the exact fire-resistance of the various materials, systems of construction, or appliances used in building practice. Such data have not as yet been available, owing to the fact that nearly all investigations of this description have been carried out by individual makers or inventors with specific commercial objects in view. The tests will be of an entirely independent character, arranged on scientific lines, but with full consideration for the practical purpose in view. All reports on tests will solely state the bare facts and occurrences, with tables, diagrams and illustrations, and on no account will reports include expressions of opinion or any expressions that might be read as comparisons or criticisms. The general direction of the tests will be in the hands of the executive, the actual tests being attended by the members of the Council and the members of the Committee in rotation. The principal building of the testing station will be used for laboratory purposes, whilst the gardens are utilised for the principal so-called "full-size" tests. These are generally carried on in brick chambers specially erected for the purpose. The fuel primarily takes the form of gas, and the principal recording instruments are the Roberts-Austen electrical pyrometers with photographic records.

REFERRING to the death of Prof. Gurlt, at Berlin, the *Lancet* remarks that as permanent secretary of the German Surgical Association he had to make the arrangements for the annual meetings of this important society and to publish its proceedings. During the last few years he had the management of the collective investigation on anæsthetics. His name will always be famous as one of the historians of surgery. Scarcely a year before his death he published his great work on the "History of Surgery during the Middle Ages and the Renaissance," the result of more than ten years' study. Prof. Gurlt was the editor of the *Archiv für Klinische Chirugie*, and co-editor of the Virchow-Hirsch *Jahresbeiträge*.

As already announced, the seventh International Geographical Congress will be held at Berlin from September 28 to October 4 of this year. The proceedings of the congress, which will include all branches of geographical science, will probably fall under three heads. In the first place, there will be lectures on geographical work and travels during recent years. In this section may be expected, among others, reports upon the results of the German Deep-Sea Expedition still at work, and also upon the geographical and geological investigations of Dr. Futterer in Central Asia. Secondly, there will be discussions concerning the international introduction of a common geographical terminology and of international methods, such, for example, as the general adoption of the metric system, of the centigrade thermometer, and of unity in geographical orthography. Lastly, international efforts will be considered, including the greatest geographical problem of the day, namely, the investigation of the Antarctic regions. The German Government has, at the suggestion of the Geographical Society of Berlin, included a sum of 50,000 marks, as a contribution towards the costs of the congress, in the budget estimates already laid before the "Reichstag." It is expected that the congress, which will this year meet for the first time in the fatherland of Humboldt and Carl Ritter, will have an importance corresponding to the high standard of geographical science in Germany.

THE well-known firm of Merck, in Darmstadt, has sent us the first number of a new periodical called *Merck's Digest*, in which they propose to publish a selection of reports on the physiological action and therapeutic uses of remedies, old and new, prepared by the firm. The firm will forward this regularly, and free of charge, to all medical men or chemists applying to Mr. E. Merck, 16, Jewry Street, London, E.C. So many new remedies are being introduced at present, that it is difficult to become acquainted with even those amongst them which are really useful, and this publication is likely to help medical men and others who desire to keep themselves *au courant* with the progress of pharmacology and therapeutics. We learn with deep regret of the death of Mr. William Merck, the senior partner in the firm, who has done such admirable service to pharmacology by providing pure alkaloids for the use of those who have been engaged in experiments on their physiological action.

THE following particulars with regard to the career of the late Mr. Merck are given in the *Chemist and Druggist*:—After his school training, Merck went to Wiesbaden and studied under Remigius Fresenius. Then in 1854 he went to Breslau to continue his chemical training under Loewig at the University of Breslau, but had to return to Darmstadt owing to the death of his father. Affairs having been settled, he next came to London, entering the Royal College of Chemistry as a student of Prof. A. W. Hofmann, with whom his elder brother George had previously been a pupil. It is interesting to recall the fact that Dr. George Merck was one of the first students of the Royal College who undertook original research, his subject (in which he was associated with Robert Galloway) being an "Analysis of the Water of the Thermal Spring of Bath," which was read before the Chemical Society in December 1846, and was the first of the researches published by the Royal College. Wilhelm Merck remained two seasons in London, then went on to Paris to complete his studies under Wurtz. This magnificent training stood him in good stead in after years. Returning to Darmstadt he took his share of the management of the business along with his brothers Karl and George. Mr. Wilhelm Merck took an active interest in the prosperity of his native town, of which he was a councillor for twenty-five years, and to which, as president for a considerable time of the Chamber of Commerce, he rendered important services. Although Mr. Merck was a retiring man, and what he did for Darmstadt was done unostentatiously, the Grand Duke, in 1889, recognised his ability and influence by appointing him Privy Councillor of Commerce, and a life-member of the Upper Chamber of the Grand Duchy. Some time previously he had been decorated with the Grand-Duke Philipp order of the first class.

THE vexed question as the exact meaning of the phrase "one hour after sunset and one hour before sunrise" in the Local Government Act, 1888, referring to the lighting of bicycle lamps, was settled from a legal point of view in a Divisional Court on Thursday last. It had been held that sunset at Greenwich was meant, and the Bristol justices convicted a cyclist for riding a bicycle without a light an hour after sunset thus defined. The alleged offence was committed on August 19, 1898, at 8.15 p.m., which was less than an hour after sunset at Bristol, but more than an hour after sunset at Greenwich. An appeal was made against the decision of the Bristol magistrates; and at Thursday's Court the appeal was allowed, and the conviction quashed, their Lordships holding that the phrase in the Act referred to must not be understood to mean Greenwich time, but local time.

MR. WALTER WELLMAN describes in the *Century Magazine* the journey in the *Frithjof* from Tromsö, Norway, to Cape Tegetthoff, Franz-Josef Land—from which place he writes, under date August 2, 1898. As to his plans he remarks:

"During the sixty days which are to pass before the coming of cold and darkness we hope to drag more than a hundred miles to the northward sufficient food and fuel to carry us through the long winter, with the aid of bear meat, while we hibernate, like bears, in a hole in the ground. In February, before the sun shall have returned, if all goes well, we shall set out upon a five-hundred-mile journey back again to the winter lair, and a two-hundred-mile journey after that to reach the ship which is to come out for us next year [1899]."

IN reporting upon the work at the Marine Biological Station at Port Erin during 1898, Prof. W. A. Herdman, F R.S., points to the necessity for further exploration in the North Atlantic. Attention has repeatedly been drawn of late years to the importance, both from the purely scientific and the industrial points of view, of the problems involved. The Scandinavians (Petterssen, Ekman, Hjort, and others) have succeeded in unravelling some of the interlacing belts of water from Arctic, Baltic, North Sea, and Atlantic sources which sweep past their coast, and affect the movements of migratory fish. It is only by such work that the mysterious movements of the herring—perhaps the most important food fish on our coast—can be rationally explained. Prof. Herdman states that it was formerly supposed that when the herrings left our shores in autumn they retired to the far north, and next season started from the Arctic regions on their annual migration, led by one large old fish—the "King of the Herrings." It is now believed that breeding and feeding are the two impulses that govern the movements of a fish. The herring comes into shallow water on our coast to spawn, and when it migrates in search of food from the Atlantic to the North Sea, or from our west coast out into deep water, there is reason to believe that it is following those minute organisms which form the plankton carried along in particular currents of water, characterised by the temperature, the salinity, and the microscopic fauna. It is possible by these characters to recognise the currents, to trace their variations from year to year, and so to some extent to determine and predict the movements of the shoals of fish. It follows, then, as Prof. Herdman remarks, that one of the most important things the biologist can do to add to our knowledge of life in the sea is to make a survey of the microscopic floating and drifting life of the sea, and its relation on the one hand to the physical conditions at the time (especially the temperature and salinity of the water), and on the other to the food materials found in the stomachs of the fish.

MR. H. C. RUSSELL has sent us an interesting paper on waterspouts, read before the Royal Society of New South Wales in August last. He states that this phenomenon is frequent on the coast of New South Wales, the spouts often occurring in groups of three or four; but on May 16, 1898, an unusual display occurred at Eden. In the early forenoon, during a light north-west wind, with fine weather and smooth sea, a heavy bank of cloud rose above the eastern horizon, and there was a flickering as if electrical discharges were going on between the cloud and sea, but nothing to indicate what was to follow. During the morning there were fourteen clear and distinct waterspouts, reaching from clouds to sea. The process of formation was—a rotary motion of the waves, large quantities of broken water being raised up gradually as a white misty-topped column, the misty part preceding the denser part by 100 to 150 feet. This went on for three or four minutes, during which time the clouds had formed an inverted cone, which seemed to be alternately dipping down and receding, with an interval of about thirty seconds between the dips, until the two cones met, and all the misty matter was absorbed. The column then remained unchanged for some minutes, the overhanging cloud getting denser, and moving slowly until the spout got out of the perpendicular and divided in the middle, the top part rising, while the lower half sank to the ocean. The paper is accompanied by nine plates, showing specimens of waterspouts observed at various times.

THE index number of *The Physical Review* (vol. vii.) contains an account of the determination of the electro-chemical equivalent of silver, recently undertaken by Messrs. Patterson and Guthe, together with a description of the experiments of Messrs. Eddy, Morley, and Miller on the velocity of light in the magnetic field, and a paper by Mr. Ferry on a photometric study of the spectra of mixtures of gases at low pressures. The first article calls attention to the recent work of Kahle, who for a number of years has been engaged at the Imperial Institute at Berlin using Helmholtz's current-balance for investigations on electro-chemical equivalents. Kahle discriminates between "old" and "new" solutions; thus an "old" solution of argentic nitrate is one originally neutral, which has become acid by successive use in voltameters. For a given quantity of electricity, larger deposits are obtained with this than with "fresh" solution; the difference often exceeds one part in one thousand—this must be regarded as a very important observation. Kahle's work is referred to in *Zschr. f. Instrum.*, 17, 144, 1897, and 18, 141, 1898; also August and September 1898. The authors describe their own experiments in which the *e.c.e.* is measured independently of g and H, by balancing the moment due to the electro-dynamic action of the two coils of an absolute electro-dynamometer, against the torsional moment of a wire with very small elastic fatigue.

FOR a long time past the City of Manchester has been in difficulty as to the disposal of its sewage, and at the present time an order obtained by the Mersey and Irwell Board for stopping the pollution of the Ship Canal by the effluent from the existing tanks, carrying a penalty of 50*l.* a day, is only in abeyance pending the result of the works now proposed to be carried out. A scheme for the construction of a culvert to carry the sewage to the estuary of the Mersey, at a cost of 258,000*l.*, was rejected by the ratepayers. It is now proposed to treat the sewage on the septic principle, which has been found successful at Exeter and other places, and to enlist the services of bacteria for the purpose of the sewage disposal; or, as the plan was described at the inquiry of the Local Government Board, recently held, "as the domestication of bacteria for the purposes of sewage disposal." The mineral matter arising from mud detritus is first to be separated by the sewage passing through catch-pits, and it is then to pass over coke-filters, which will cover fifty acres, and in these the "tame microbes" are to be turned on to resolve the impure sewage into water of sufficient purity to be discharged into the Ship Canal. The quantity of sewage to be dealt with is 20,000,000 gallons a day, and this is now treated with chemicals at an annual cost of 17,000*l.* a year, at least half of which is to be saved by the action of the microbes, and it is anticipated that an effluent will be produced that will be satisfactory to the Mersey and Irwell Committee. The Manchester sewage is of an exceptional character, as it contains much trade refuse; but experiments, which have for some time past been conducted by Prof. Frankland, have proved that by means of "double contact beds" the bacteria soon get accustomed to take this sewage, and it has been shown that by this means the whole sewage of the city can be successfully dealt with.

THE international quarterly journal hitherto published under the title *Terrestrial Magnetism* will in future bear the name *Terrestrial Magnetism and Atmospheric Electricity*. With the forthcoming (March) number this periodical, which is devoted exclusively to terrestrial magnetism, and atmospheric electricity —such as earth currents, auroras, &c.—will enter on its fourth volume. The journal is conducted and published by Dr. L. A. Bauer and Mr. Thomas French, jun., with the assistance of a number of distinguished physicists in various parts of the world. Every issue of the periodical hereafter is to contain at least eight pages of abstracts and reviews, and in every number a half-tone portrait of an eminent magnetician will appear.

A number of valuable physical papers have been recently published in English in the *Communications* from the Physical Laboratory of the University of Leiden. In the parts now before us, Dr. H. Kamerlingh Onnes describes a hydrogen thermometer for the measurement of low temperatures, and a standard open-tube manometer for high pressures, consisting of sixteen partial manometers connected together in series. Mr. Ch. M. A. Hartman gives the results of observations on the composition and volume of the coexisting vapour and liquid phases of mixtures of methyl-chloride and carbonic acid, and arrives at the result that at the chosen temperature of 9·5° the vapour pressure of the liquid phase of the mixture may be expressed in terms of those of its components, with near approximation, by the formula $p = p_1(1 - x) + p_2x$. In another part, Dr. E. van Everdingen, jun., discusses the galvano-magnetic and thermo-magnetic phenomena in bismuth, and criticises Riecke's theory.

Prof. E. Villari writes in the *Atti dei Lincei*, vii. 10, on the way in which tubes diminish the electro-dispersive power of Röntgen rays. The experiments all point to the conclusion that the discharge of an electroscope by the action of these rays is due to the air acted on by them. An electroscope placed in the umbra of the rays is discharged by the Röntgenised air which passes into the umbra by diffusion. If between the Crookes' tube and the electroscope there be interposed a tube of glass or zinc, which cuts off the lateral divergent rays, the discharge is greatly retarded, and the same is the case when the ball of the electroscope is enclosed in a tube turned towards the source of the rays, as this prevents the lateral air from reaching the electroscope. When the electroscope is covered by a tube of zinc, so that charges of opposite signs are developed by electrostatic induction on the inside and outside of the tube, the action of Röntgen rays is in the first place to discharge the outside of the tube, and the electroscope falls several degrees; subsequently the electroscope itself is slowly discharged by the Röntgenised air inside the tube. An exactly analogous effect takes place with a tube of paraffin. Under the action of Röntgen rays, or of a flame, the tube becomes oppositely charged to the electroscope, and the latter is afterwards slowly discharged by the Röntgenised air inside the tube. If there be no air between the tube and the electroscope, the initial discharge alone takes place. The present experiments thus afford an explanation of the phenomena observed with tubes and blocks of paraffin, which were described by Lord Kelvin, but left uninterpreted, some time since, in the columns of Nature.

We have received a copy of the "Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the year 1896," by F. B. Weeks, published as *Bulletin* No. 149, of the United States Geological Survey. This contains reference to 788 papers, books, maps, &c., with a most excellent classified index. It records works on the geology of the United States, Canada and Mexico, whether published in North America or elsewhere.

The Cretaceous Foraminifera of New Jersey are described by Mr. R. M. Bagg, jun., in *Bulletin* No. 88 of the United States Geological Survey, 1898. Some of the prominent species, including also several new forms, are illustrated in six plates. The Foraminifera were collected from the Greensand series of the Upper Cretaceous, and Mr. Bagg remarks that he has frequently found the tiny shells filled with glauconite: in other cases the grains of glauconite are internal casts of Cristellariæ, &c. Many of these forms are partially filled with a light brown clay, suggesting the early stage in the formation of the glauconite grain. Mr. Bagg pays a deserved compliment to Mr. C. D. Sherborn, whose "Bibliography of Foraminifera," and "Index to the Genera and Species of Foraminifera," have, by their completeness and accuracy, lightened the labours of all workers on the subject.

We have received a copy of the second edition of Mr. F. N. Williams's "Provisional and Tentative List of the Orders and Families of British Flowering Plants."

Prof. R. v. Wettstein reprints, from the *Transactions* of the German Association for Natural Science and Medicine of Bohemia, an interesting paper on the various modes of protection of the flowers of geophilous plants—that is, those whose flowers are more or less completely formed beneath the surface of the soil, a class which includes all our very early spring-flowering herbaceous plants.

Mr. T. F. Mott sends us two papers on the origin of organic colour, in which he thus sums up his conclusions:—That the gradual development of organic colour is a physiological necessity; that brilliant coloration is a mark of the maturity of some organic force-wave, in which the molecular rhythm has reached its maximum simplification; and that the effect of insect selection in the development of coloured flowers is comparatively small.

In a paper in the number of the *Biologisches Centralblatt* for January 1, 1899, Prof. J. Wiesner reviews the state of our knowledge respecting the adaptation of leaves to the intensity of light. He classifies leaves under two heads in this respect—"photometric," or those which assume special positions in order to receive as much light as possible, or to avoid too strong a light; and "aphotometric," those which have no such faculty. The former, again, may be either "euphotometric," when they place themselves in a position to receive the maximum of diffused light; or "panphotometric," when they are adapted to receive both direct and diffused sunlight, but are protected against an excess of the former.

Messrs. Dulau and Co. have issued a catalogue of books and papers on general geology which they have for sale.

With reference to the appeal for additional work on telegony, referred to last week (p. 301), Mr. G. B. Bulman asks us to say that communications should be addressed to him at Cullercoats, Whitley, R.S.O., Northumberland.

An illustrated catalogue of physical apparatus, including drawing, surveying, and engineering instruments, balances and weights, and apparatus required in classes under the Department of Science and Art, has been received from Mr. T. M. F. Tamblyn-Watts.

The following lectures have been arranged to take place at the Royal Victoria Hall, Waterloo Bridge Road, on Tuesdays during February:—February 7, "About some Worms," Prof. Weldon, F.R.S.; February 14, "Some Facts about Liquids," Prof. Holland Crompton; February 21, "India," Mr. R. M. Beachcroft; February 28, "Volcanoes," Prof. H. G. Seeley, F.R.S.

The osteometric index calculator, referred to by Mr. David Waterston in Nature of October 20, 1898 (vol. lviii. p. 597), is described and illustrated in the *Journal of Anatomy and Physiology*. The instrument provides a ready means of finding the cephalic index from two measures of length and breadth of the head.

MESSRS. GINN AND Co. announce the forthcoming publication of "A Laboratory Manual in Astronomy," by Mary E. Byrd. The manual is designed as a handbook of laboratory instruction to accompany the study of elementary and general astronomy in secondary schools and colleges. The same firm announces a college text-book of "Physics," by Profs. Charles S. Hastings and Frederick E. Beach.

THE zoological material collected by Dr. Arthur Willey from New Britain, New Guinea, Loyalty Islands, and elsewhere, during his expedition in search of the eggs of the Pearly Nautilus, is being studied by a number of distinguished zoologists, and the first two parts of a work containing the results have been published by the Cambridge University Press. It is expected that five or six similar parts will be issued; and we defer our notice of the work until all of them have been published.

THE density of liquid air is the subject of an interesting paper by Prof. A. Ladenburg and Dr. C. Krügel, in the current number of the *Berichte*. The hydrostatic method with a Westphal balance was employed. It is pointed out that a determination of the density of liquid air obtained in the usual way is of little value unless accompanied by a determination of the exact composition of the mixture, since, as is well known, after standing some time, the residual fluid is nearly pure oxygen. In these experiments, the whole of the liquid was allowed to evaporate into large gasholders, and the gaseous mixture analysed. From these results, the authors calculated that the density of normal liquid air containing 20·9 per cent. of oxygen would be ·871. It was found that the density of the liquid containing 93·6 per cent. of oxygen was higher than that of pure oxygen. It is suggested that this may be due to carbon dioxide or krypton.

CONSIDERING its exceptional behaviour with respect to hydrogen, the metal palladium has not hitherto been used to the extent that would have been expected as a reducing agent in organic chemistry. The mode of application of palladium, however, described by Dr. N. Zelinsky in the current number of the *Berichte*, would appear to promise a more extensive use of this metal. A zinc-palladium couple is prepared from zinc and palladium chloride, in a manner similar to the well-known zinc-copper couple. This is placed in alcohol, and acid added until hydrogen gas just commences to be evolved. At this stage the palladium black is saturated with hydrogen, and produces energetic reduction of the alkyl iodide or bromide, the acid and iodide being now added alternately. Hexamethylene, and the ethyl and methyl-hexamethylenes, which are obtained with great difficulty from their halogen derivatives by ordinary reducing agents, are produced in yields of 70–75 per cent. of the theoretical, when the corresponding iodides or bromides are treated in this way.

THE additions to the Zoological Society's Gardens during the past week include a Chimpanzee (*Anthropopithecus troglodytes*, ♀) from West Africa, presented by Miss K. M. Burne; a Green Monkey (*Cercopithecus callitrichus*, ♂) from West Africa, presented by Mr. F. W. Coker; a Two-spotted Paradoxure (*Nandinia binotata*) from West Africa, presented by Miss A. M. Deeks; a Black-headed Lemur (*Lemur brunneus*, ♂) from Madagascar, deposited; a Tui Parrakeet (*Brotogerys tui*) from Brazil, an Uvæan Parrakeet (*Nymphicus uvaensis*) from the Island of Uvea, Loyalty Group, three Common Crowned Pigeons (*Goura coronata*) from New Guinea, purchased; two Barnard's Parrakeets (*Platycercus barnardi*) from South Australia, received in exchange.

OUR ASTRONOMICAL COLUMN.

ASTRONOMICAL OCCURRENCES IN FEBRUARY:—

February 10. 19h. Venus at greatest elongation 46° 46′ west. This planet rises nearly three hours before the sun, and presents a brilliant appearance in the south-east sky.
10. Date of computed perihelion passage of Denning's comet (1881 V.).
11. 10h. 39m. Minimum of Algol (β Persei).
12. 7h. 35m. to 8h. 28m. Occultation of the star 19 Piscium (mag. 5·2) by the moon.
14. Mars. Illuminated portion of disc 0·969.
14. Venus. ,, ,, ,, 0·517.
14. 7h. 28m. Minimum of Algol (β Persei).
15. Jupiter. Polar diameter 35″·8. The planet rises at midnight, and is favourably visible afterwards.
16. 15h. 45m. to 17h. Transit of Jupiter's Sat. III.
18. 8h. 53m. to 10h. 11m. Occultation of the star 103 Tauri (mag. 5·5) by the moon.
24. Saturn. Outer minor axis of the outer ring = 16″·82. Polar diameter 15″. The planet may be well seen as a morning star.

HARVARD COLLEGE OBSERVATORY.—In the fifty-third annual report of this well-known observatory, Prof. Pickering, the director, again chronicles the completion of an enormous amount of work. With the east equatorial (15-inch), under the charge of Mr. O. C. Wendell, about 25,000 photometric light comparisons have been made, chiefly with the new polarising photometer with achromatic prisms. This instrument was also used in the photometric measurement of Jupiter's satellites while undergoing eclipse.

Similar photometric comparisons of variable stars, to the number of about 1650, have been made with the west equatorial (6-inch). These observations are now reduced and will shortly be published. In addition, comparison stars have been selected for sixty other variables, and the co-operation of other astronomers in following up the stars when too faint for the 15-inch is invited, for which purpose charts and lists of the stars in question will be furnished on application.

The reduction of the observations of fundamental stars with the meridian circle, by the late Prof. Rogers, were incomplete at the time of his death, and are still therefore under discussion.

With the meridian photometer the observations have been made by the director. Extending over 152 nights, the number of settings has been 73,684. This completes the work that was planned in 1892 for this instrument, and it is proposed to send it to Arequipa next spring, to revise the contents of the Southern Harvard Photometry.

Photometric observations of faint stars have also been commenced by the director using a 12-inch telescope mounted horizontally, and having a Welsbach burner for artificial comparison.

In connection with the spectroscopic work of the Henry Draper Memorial, 2192 photographs have been taken with the 8-inch telescopes. By the examination of these and other plates taken with the Bruce and Bache telescopes, Mrs. Fleming has detected twelve new variable stars, six of which showed *bright* hydrogen lines; nine stars have spectra of the fourth type, seventeen of the fifth, and ten objects are catalogued as gaseous nebulæ. In three known variables—V Tauri, U Cancri, T Capricorni—the hydrogen lines have been found bright.

With the 11-inch Draper telescope 873 plates have been taken, and a photograph of α Canis Majoris obtained at mid-day under conditions rendering it probable that bright stars could be thus usefully photographed when in transit.

Photographs of stars near the pole have been taken with the 15-inch reflector, with the object of accurately determining the constants of aberration, precession, and nutation.

The examination of the photographs of star clusters for variables has been continued, resulting in the detecting of 509 stars of this type. The most notable occur in the clusters ω Centauri, Messier 3, Messier 5, and Messier 15.

With the Bruce photographic doublet, photographs have been obtained which, with three and four hours' exposure, show no distortion of the star images, and Prof. Turner reports favourably on the freedom from distortion over an area of 4° × 4°. Both chart plates and stellar spectra have been taken with this instrument.